

ABSTRACT OF THE INVENTION

The invention provides a process for forming a low k fluorine and carbon-containing silicon oxide dielectric material by reacting with an oxidizing agent one or more silanes containing one or more organofluoro silanes having the formula $\text{SiR}_1\text{R}_2\text{R}_3\text{R}_4$, where: (a) R_1 is selected from H, a 3 to 10 carbon alkyl, and an alkoxy; (b) R_2 contains at least one C atom bonded to at least one F atom, and no aliphatic C-H bonds; and (c) R_3 and R_4 are selected from H, alkyl, alkoxy, a moiety containing at least one C atom bonded to at least one F atom, and $((\text{L})\text{Si}(\text{R}_5)(\text{R}_6))_n(\text{R}_7)$; where n ranges from 1 to 10; L is O or CFR_8 ; each n R_5 and R_6 is selected from H, alkyl, alkoxy, and a moiety containing at least one C atom bonded to at least one F atom; R_7 is selected from H, alkyl, alkoxy, and a moiety containing at least one C atom bonded to at least one F atom; and each R_8 is selected from H, alkyl, alkoxy, and a moiety containing at least one C atom bonded to at least one F atom. Also provided is a low dielectric constant fluorine and carbon-doped silicon oxide dielectric material for use in an integrated circuit structure which contains: silicon atoms bonded to oxygen atoms; silicon atoms bonded to carbon atoms; and carbon atoms bonded to fluorine atoms; where the dielectric material also has a characteristic selected from: (a) the presence of at least one C-C bond; (b) the presence of at least one carbon atom bonded to from 1 to 2 fluorine atoms; and (c) the presence of at least one silicon atom bonded to from 0 to 2 oxygen atoms.